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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte DMITRI SIMONIAN
and JOHN D. PORTER

Appeal 2009-003058
Application 10/713,671
Technology Center 1700

Decided: January 21, 2010

Before ADRIENE LEPIANE HANLON, TERRY J. OWENS, and PETER F. KRATZ, *Administrative Patent Judges*.

HANLON, *Administrative Patent Judge*.

DECISION ON APPEAL

A. STATEMENT OF THE CASE

This is an appeal under 35 U.S.C. § 134 from an Examiner's decision rejecting claims 1-6, 8-13, 15-39, 43-64, and 84-89. We have jurisdiction under 35 U.S.C. § 6(b). We AFFIRM.

Claims 31 and 85, reproduced below, are representative of the subject matter on appeal.

> 31. A method for modifying a surface of a microelectromechanical device that is assembled within an assembly, the method comprising:
>
> loading the assembly into a chamber;
>
> preparing a gaseous modification agent; and
>
> introducing the gaseous modification agent into the chamber such that the gaseous modification agent is delivered though a micro-opening of the assembly to the surface of the microelectromechanical device for modifying the surfaces of the microelectromechanical device, *wherein the micro-opening is between a first substrate and a second substrate that is glass having a reflective and deflectable mirror plate formed thereon*; wherein the micro-opening has a characteristic dimension around 10 micrometers or less.
>
> 85. A method comprising:
>
> loading a microelectromechanical device into a chamber;
>
> *introducing a first cleaning agent into the chamber for cleaning a surface of the microelectromechanical device in the chamber, wherein the chamber has a first pressure*;
>
> *introducing a second cleaning agent into the chamber for cleaning the surface of the microelectromechanical device in the chamber, wherein the chamber has a second pressure that is different from the first pressure*; and
>
> wherein the method is performed in the absence of an application of ultraviolet light.

Appeal Brief dated December 10, 2007 ("Br."), at Claims Appendix (emphasis added).

Similar to claim 85, claim 1 recites a method comprising the steps of introducing a first cleaning agent component into the chamber such that the pressure inside the chamber is at a first pressure and introducing a second cleaning agent component into the chamber such that the pressure inside the chamber is higher than the first pressure. Br., Claims Appendix.

The following Examiner's rejections are before us on appeal:[1]

(1) Claims 1-6, 8-13, 15-30, and 84-89 are rejected under 35 U.S.C. § 103(a) as unpatentable over the combination of Ashurst[2] and Hankins.[3,4]

(2) Claims 26 and 27 are rejected under 35 U.S.C. § 103(a) as unpatentable over the combination of Ashurst, Hankins, and Wallace.[5]

(3) Claims 31-39, 43, and 44 are rejected under 35 U.S.C. § 103(a) as unpatentable over the combination of Ashurst, Hankins, and Malone.[6]

B. ISSUES

As to claims 1 and 85, the Examiner contends that Ashurst discloses a cleaning process comprising the introduction of two cleaning agents (i.e., O_2

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[1] In the Examiner's Answer all grounds of rejection citing Chinn (US 6,830,950) were withdrawn. Examiner's Answer dated March 10, 2008 ("Ans."), at 2.

[2] W. Robert Ashurst et al., *Wafer Level Anti-Stiction Coatings for MEMS*, 1-27 (2003).

[3] US 7,045,170 B1 to Hankins et al. issued May 16, 2006.

[4] The Examiner indicates that all of the pending claims are rejected. *See, e.g.,* Final Office Action dated February 8, 2007, at 1 ("Disposition of Claims"). However, the Examiner inadvertently omitted claims 19, 21, and 22 from the statement of the rejection. The Appellants do not argue that claims 19, 21, and 22 are separately patentable over the prior art of record. Therefore, the Examiner's error is harmless.

[5] US 5,512,374 to Wallace et al. issued April 30, 1996.

[6] US 6,951,769 B2 to Malone issued October 4, 2005.

and water gas). Ans. 7. The Appellants contend that Ashurst suggests that the water gas is used to displace the O_2 cleaning agent rather than to clean the micromechanical device surface. Br. 10-11. The Appellants do not separately address any of the claims that depend from claim 1 or claim 85.

As to claim 31, the Examiner contends that Malone discloses a micro-opening between a first substrate 225 and a second substrate 205 wherein the second substrate includes a micromachined device having a mirror array thereon. Ans. 8. The Appellants contend that the substrate of Malone on which the mirror plates are formed does not form a portion of the package cavity. Br. 14. The Appellants do not separately address any of the claims that depend from claim 31.

As for the remaining claims, i.e., claims 45-64, the Appellants indicate that "Claims 45-64 hereby are withdrawn." Br. 2. Claims 45-64 have not been cancelled. Therefore, we understand the Appellants' statement to mean that the rejection of claims 45-64 under § 103(a) is not contested. Accordingly, the rejection of claims 45-64 is summarily affirmed.

In view of the foregoing, the only issues on appeal are:

(1) Have the Appellants identified reversible error in the Examiner's finding that Ashurst discloses introducing two cleaning agents as recited in claims 1 and 85?

(2) Have the Appellants identified reversible error in the Examiner's finding that Malone discloses a micro-opening between a first and a second substrate as recited in claim 31?

C. FINDINGS OF FACT

Ashurst discloses the following cleaning procedure:

> [T]he samples are cleaned of any organic contamination that usually results from the CPD process by *in situ* plasma cleaning. This is accomplished by first creating a background of oxygen (O_2) gas in the chamber by performing purge-pump cycles with O_2. Then, O_2 is admitted into the chamber so that the pressure of O_2 is about 300 mTorr. Next, a downstream plasma is struck by applying a DC bias (about 700V) to the perforated electrodes. . . . While the O_2 plasma is on, water gas is dosed into the chamber (about 500 mTorr) which, over time effectively displaces the O_2. Exposure of silicon to a water plasma is known to leave the surfaces hydroxyl (-OH) terminated . . . .

Ashurst 9:6-17.

According to one embodiment of the Appellants' method, a silicon surface is terminated by –OH groups during the cleaning process. Spec., para. [0045].

Malone Figure 2C illustrates a MEMS assembly 200 comprising an assembly lid 225 that is tack-welded to an assembly substrate 205 creating openings or vents 240 along the MEMS assembly. Malone 3:49-59.

Malone discloses that a MEMS mirror array 210 is mounted on the assembly substrate 205. Malone 3:16-19.

D. ANALYSIS

1. Issue (1)

Ashurst discloses that samples are cleaned by admitting O_2 into the chamber at a particular pressure followed by dosing water gas into the chamber at a higher pressure. Ashurst 9:6-17. The Examiner explains that "the fact that water is dosed into the chamber which over time displaces the oxygen to leave surfaces hydroxyl terminated does not negate the fact that the cleaning process includes the claimed water vapor." Ans. 7.

The Examiner's position is reasonable based on the record before us. That is, it is reasonable to find that dosing water gas into the chamber cleans a surface of the micromechanical device by displacing the O_2 and removing any contaminants from the chamber. The Appellants have failed to direct us to any evidence to the contrary.

2. Issue (2)

The Appellants do not point to any error in the Examiner's finding that the mirror array (210) forms part of the substrate 205. *See* Ans. 8. Instead, the Appellants argue that "the substrate of Malone on which deflectable mirror plates are formed does not form a portion of the package cavity." Br. 14.

Claim 31 does not recite that the substrate on which a deflectable mirror plate is formed must form a portion of a package cavity. In fact, claim 31 does not even recite a "package cavity." Thus, the Appellants' argument is not persuasive of reversible error. *See In re Self*, 671 F.2d 1344, 1348 (CCPA 1982) (arguments based on limitations not appearing in the claims fail at the outset).

E. DECISION

The decision of the Examiner is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a).

AFFIRMED

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